

Cost, Schedule, Manpower

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Outline

- Cost and Schedule Chronology
- Work Breakdown Structure (WBS)
- Preliminary cost methodology
 - Cost Basis
 - Manpower
 - Contingency
 - Rates & Overheads
- Preliminary cost estimate by WBS
- Procurement Strategy
- Project Controls System
 - Reporting Milestones
- Configuration management system

Cost and Schedule Chronology

- System experts' bottoms up estimates in '05 \$ in Excel.
- Summary schedule developed.
- Microsoft Project 2003 software adopted as the EBIS cost and scheduling tool.
- 3-day Microsoft Project course held onsite in June.
- Tasks entered and resources applied.
- Identification of task dependencies in process.
- High level milestones included.
- Next:
 - Complete the inter-subsystem logic
 - Iterate schedule to fit funding profile
 - Verify critical path
 - Continue adding milestones

Work Breakdown Structure

Organized by subsystem, each with its own manager, allowing direct accountability for cost and schedule.

Cost accounts planned at level 2 or lower, as determined by the subsystem managers.

*Commissioning costs are currently estimated within the subsystem WBS's but will be reassigned to WBS 1.12 for baselining.

WBS	Title
1.1	Structural components
1.2	Controls Systems
1.3	Diagnostics/instrumentation
1.4	Magnet Systems
1.5	Power Supply Systems
1.6	RF Systems
1.7	Vacuum systems
1.8	Cooling Systems
1.9	Facility Modifications
1.10	Installation
1.11	Project Services
1.12	Commissioning*
1.13	R&D

Preliminary Cost Methodology

- Tasks defined and estimated by those who will manage/perform the effort, using an agreed-to scope of work
- Basis of estimate for WBS elements identified
 - CP – Catalog Price
 - VQ – Vendor Quote
 - HC – Historical Cost
 - EJ – Engineering Judgment

Cost Basis

CP - Catalog Price

VQ - Vendor Budgetary Quote

Definition - A budgetary estimate from a supplier, service supplier (installation, design, consulting, project management, testing, etc.), or other industrial (non-laboratory) source of equipment and/or services. Material, labor, or service costs from vendor catalogs are considered vendor estimates.

Backup material - a fax, catalog page, memorandum of a telephone conversation or other indication of the source of the quote, items included, and the projected cost.

HC - Historical Costs

Definition - Cost based on actual costs from previous projects.

Backup material - an indication of the previous project and the actual cost.

EJ - Engineering Judgment

Definition - Based on techniques such as rules of thumb; taking a percentage of the material, material + installation or other cost base; national cost estimating standards/codes ("Means", square footage of sites, etc.)

Backup material - Identify the rule of thumb, actual cost and its source; percentage, base, standard, or code used; the square footage used and the cost per square foot applied; or other engineering judgment basis.

Manpower

- Total BNL hours estimated at 52K, approximately 30 Full Time Equivalent years (Man-years).
- No resource conflicts are anticipated.
- No new hires are anticipated for the project.
- No impact on RHIC operations.

Category	FTE/yr
Administrator	0.8
Scientist	2.9
Engineer	9.6
Designer	3.1
Technician	9.6
Management	0.5
Building Trades	3.0
Total	29.6

Contingency

Technical Risk Description	Cost Risk Description	Schedule Risk Description	Contingency Rate
Direct copy of an existing, working design	Off the shelf hardware or purchased from a catalog	No schedule impact on any other WBS item	10%
Based on an existing design but requiring extensive modifications	Based on a vendor quote using limited conceptual design sketches	Delays completion of only its own non-critical path subsystem item	20%
New design different from established designs or existing technology	Estimate for item with little in-house experience	Delays completion of other non-critical path subsystem items	30%
New design requiring R&D to develop advanced state-of-the-art technology	Top down estimate derived from comparable previous programs	Directly delays completion of critical path subsystem item	40%

Estimated for each lowest level WBS item/task. An averaged rate was used when risk levels differed across categories.

Rates and overheads

- Departmental Rates and Overheads
 - Labor rates based on C-AD average salary by category
 - Departmental Fixed Costs distributed as a % direct labor
 - Chairman's Office
 - Administration
 - ESH&Q
 - Information Technology
 - Communications
 - Space
 - Building Power
- Laboratory Rates and Overheads
 - Extraordinary Construction
 - Reduced overheads for high value procurements
- Escalation Rates for DOE Projects (January 2004)

Preliminary Cost Estimate by WBS

WBS	Title	Direct, 05 K\$'s						Burdened, AY K\$'s					
		Mat'l	Labor	Cost	Cont %	Cont \$	Total cost	Mat'l	Labor	Cost	Cont %	Cont \$	Total cost
1.1	Structural components	1675	680	2355	28%	665	3020	2015	1260	3275	27%	890	4165
1.2	Controls Systems	350	100	450	22%	100	550	435	165	600	23%	135	735
1.3	Diagnostics/instrumentation	290	175	465	20%	95	560	380	295	675	20%	135	810
1.4	Magnet Systems	295	155	450	21%	95	545	350	250	600	22%	130	730
1.5	Power Supply Systems	1350	195	1545	26%	400	1945	1665	310	1975	25%	500	2475
1.6	RF Systems	1305	375	1680	28%	470	2150	1670	655	2325	27%	630	2955
1.7	Vacuum systems	761	305	1066	20%	215	1281	940	510	1450	20%	290	1740
1.8	Cooling Systems	195	40	235	21%	50	285	240	60	300	20%	60	360
1.9	Facility Modifications	380	135	515	26%	135	650	475	225	700	26%	180	880
1.10	Installation	145	940	1085	21%	230	1315	180	1720	1900	21%	400	2300
1.11	Project Services	0	370	370	20%	75	445	0	625	625	20%	125	750
1.12	Commissioning*			0			0			0			0
1.13	R&D / CDR	345	583	928	16%	145	1073	500	700	1200	17%	200	1400
Estimated Totals for Project		7091	4053	11144	24%	2675	13819	8850	6775	15625	24%	3675	19300

* Commissioning included in above WBSs

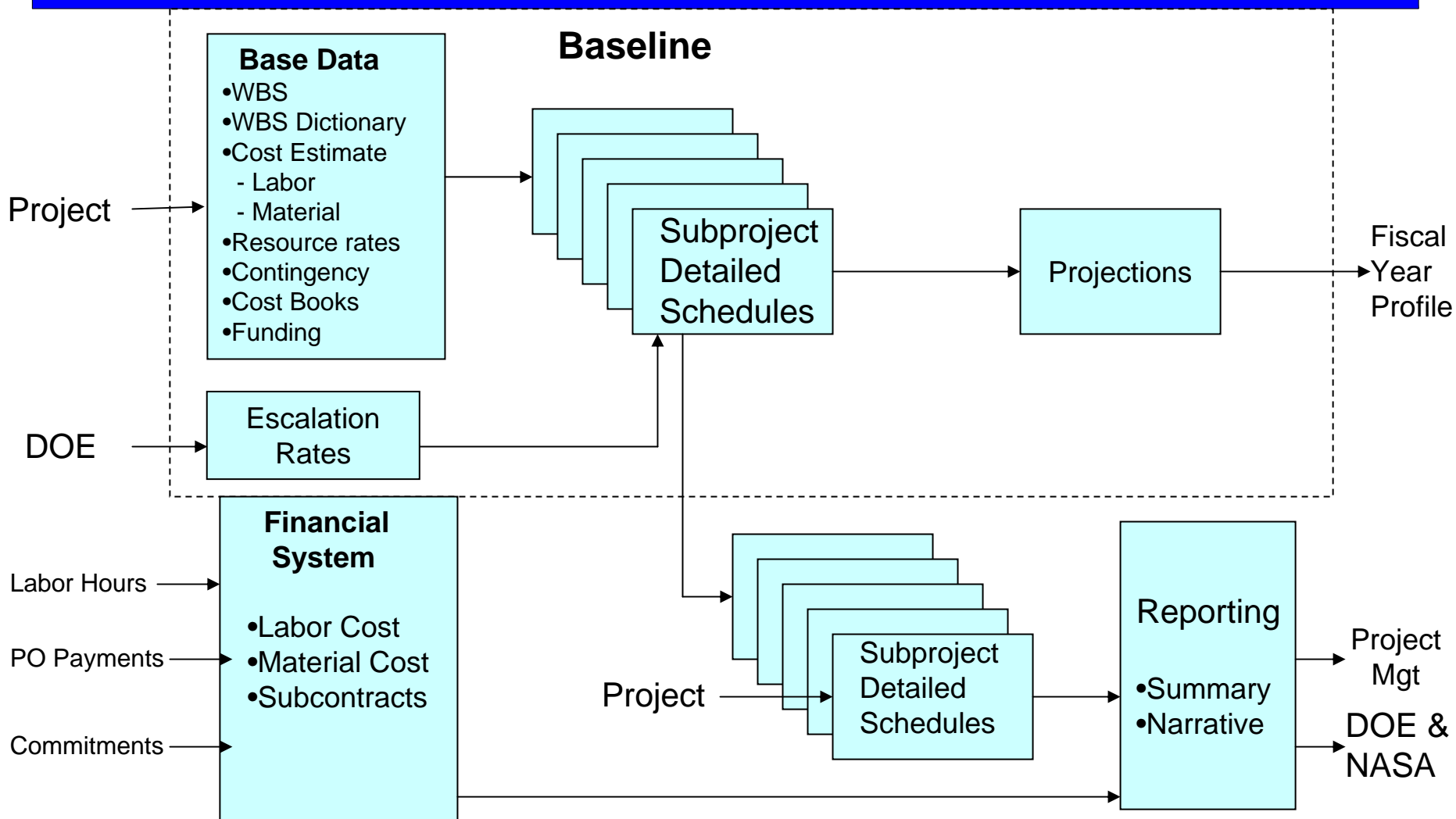
- Subcontract/Purchase Order &
- Basic Ordering Agreement (BOA)
 - Fixed-Price
 - Incrementally Funded
- Competitive bids planned vs. sole source
- No Cost-reimbursement/Cost-plus contracts are planned

Major procurements (order >\$100K) will be tracked in Microsoft Project with a minimum of the following planned dates: design package complete, purchase requisition date, purchase order date, delivery date.

Major Procurements

- Procurements > \$100K (in FY'05\$)
 - RFQ : \$340k
 - Linac: \$400k
 - Superconducting Solenoid: \$328k
 - RFQ Power Amp: \$400k
 - Linac Power Amp: \$400k
 - Buncher PA's (3) \$150k
 - Electron Collector PS \$200k
 - HEBT big bend dipole PS \$150k
 - HEBT dipole magnets (2) \$219k

Project Control System flow diagram



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Configuration Mgmt online system

[Project Change Request \(PCR\)](#)

[Cost, Schedule, Technical Assessment \(CSTA\)](#)

[Document Change Notice \(DCN\)](#)

[Track Submitted Documents](#)

[PCR Status Report](#)

[Approvals](#)

[Reports](#)

[Risk/Contingency List](#)

[Implementation Date/Rev. Number](#)

[WBS Descriptors](#)

[WBS List](#)

[Parameters](#)

[Configuration Management Plan](#)



Summary

- Scope is defined.
- Costs are understood.
- EBIS Project Team in place.
- Integrated Project Team defined.
- Project Controls systems set up.
- Ready for Preliminary Baseline Approval.